APPLETON, EDWARD VICTOR (*b.* Bradford, Yorkshire, England, 6 September 1892; *d.* Edinburgh, Scotland, 21 April 1965), *radio physics.*

Appleton showed exceptional promise as a boy, matriculating at the University of London at sixteen and winning a scholarship to St. John's College, Cambridge, at eighteen. He graduated with first class honours in physics in 1913 and started postgraduate work in crystallography under William Henry Bragg. Shortly after the outbreak of World War I he became a signals officer in the Royal Engineers, an assignment that aroused his interest in radio.

Upon his return to Cambridge after the war, Appleton first investigated vacuum tubes at the Cavendish Laboratory with Balthazar van der Pol, Jr., and later wrote a monograph on the subject, *Thermionic Vacuum Tubes* (1932). He next turned to the study of the fading of radio signals. In 1924, when he was only thirty-two, he became Wheatstone professor of physics at King's College of the University of London, where he remained for twelve years. During the first year, he and Miles Barnett, a graduate student from New Zealand, performed a crucial experiment that led to a measurement of the height of the reflecting atmospheric layer of ionized gases, which had been postulated by Oliver Heaviside and A. E. Kennelly in explanation of the first transatlantic radio transmission by Guglielmo Marconi in 1901. In the experiment, the frequency of the new British Broadcasting Company transmitter at Bournemouth was periodically varied after broadcasting hours at a constant rate, so that the interference between the direct (ground) and reflected (sky) waves resulted in a regular fading in and out at a site about 100 kilome-

ters away, in a manner analogous to the behavior of optical interference fringes.

Appleton's experimental proof that the Kennelly-Heaviside, or *E*, layer really existed, a scientific accomplishment of the highest order, was honored by his election as fellow of the Royal Society (1927), a knighthood (1941), and the Nobel Prize in physics (1947), "for his investigation of the physics of the upper atmosphere, especially for the discovery of the so-called Appleton layers." The last refers to the later discoveries of a second (*F*) layer at more than twice the height of the *E* layer and a third (*D*) layer below the *E* layer. Besides discovering these layers, Appleton and his co-workers showed that the sky wave generally was elliptically polarized, and calculated the reflection coefficients and electron densities of the layers and their diurnal and seasonal variations. His work may also be considered to be of prime technological significance, not only in regard to radio transmission but also as a milestone in the development of radar; the determination of the height of the *E* layer was the first distance measurement made by radio, a technique that was closely followed by Robert Alexander Watson-Watt, the British radar pioneer, who had collaborated with Appleton in atmospheric research and had many subsequent professional contacts with him. The rest of Appleton's life was spent in research flowing from his own discoveries, an endeavor in which he continued to maintain a degree of involvement that was astonishing in view of the many other duties thrust upon him.

Following a three-year tenure as Jacksonian professor of natural philosophy at the University of Cambridge, Appleton was appointed secretary of the government's Department of Scientific and Industrial Research. In 1949 he was made principal and vice-chancellor of the University of Edinburgh, where he remained until his death. Appleton was a great international figure: his first paper on the ionosphere was published in a Dutch journal (in Dutch); he served as vice-president of the (U.S.) Institute of Radio Engineers in 1932; he was president of the International Scientific Radio Union (URSI) from 1934 to 1952; and he was instrumental in organizing the first International Geophysical Year in 1957, a year of maximum sunspot activity. After moving to Edinburgh, he founded the *Journal of Atmospheric Research* (affectionately known as "Appleton's Journal") and served as its editor-in-chief for the rest of his life.

Appleton married Jessie Longson in 1915; they had two daughters, Marjery and Rosalind. A month before his death, Appleton, a widower since 1964, married Mrs. Helen F. Allison, who had been his private secretary for thirteen years.

BIBLIOGRAPHY

A list of Appleton's honors, decorations, medals, and the most important papers he wrote and collaborated in (a total of 140) appears in the obituary by his long-time associate, J. A. Ratcliffe, in *Biographical Memoirs of Fellows of the Royal Society*, **12** (1966), 1–21. See also obituaries in *The Times* (London), 23 April 1965; and in *Science and Culture*, **31** (1965), 348–350.

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